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September 5, 2014

Ms. Hillary Young, P.E.
Chief Engineer
Land Protection Division
Oklahoma Department of Environmental Quality
707 North Robinson
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

**RE: Mid-Way Environmental Services, Inc.
Non-Hazardous Waste Injection Well
Permit No. IW-NH-41001-OP
Seismicity Contingency Plan**

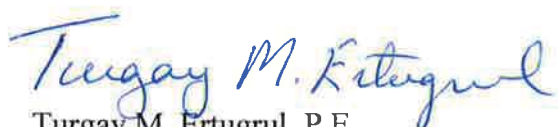
Dear Ms. Young:

In accordance with the above referenced Operating Permit for the injection of Non-Hazardous Waste, and on behalf of our Client Mid-Way Environmental Services, Inc. (the Permittee), A&M Engineering and Environmental Services, Inc. (A & M Engineering) is hereby submitting two (2) copies of a Seismicity Contingency Plan.

The Seismicity Contingency Plan has been prepared in accordance with the Operating Permit which became effective August 11, 2014, and addresses the each of items identified in Part A, Item #10 of the Permit.

If you have any questions on this matter, or if you require any additional information, please do not hesitate to contact me at 918.665.6575.

Sincerely,
A & M Engineering and Environmental Services, Inc.


Turgay M. Ertugrul, P.E.
Vice President



MID-WAY
ENVIRONMENTAL SERVICES, INC.

SEISMICITY CONTINGENCY PLAN

FOR

MID-WAY ENVIRONMENTAL SERVICES, INC.

CLASS I NON-HAZARDOUS INJECTION WELL

PERMIT NUMBER IW-NH-41001-OP

WITHIN THE N/2 OF THE NE/4 OF THE NW/4 OF THE SW/4

OF

SECTION 9, TOWNSHIP 14 NORTH, RANGE 5 EAST

LINCOLN COUNTY, OKLAHOMA

DATE SUBMITTED: SEPTEMBER 5, 2014

PREPARED FOR:

MID-WAY ENVIRONMENTAL SERVICES, INC.

120 NORTH 8TH AVENUE

STROUD, OKLAHOMA 74079

SUBMITTED TO:

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

LAND PROTECTION DIVISION

OKLAHOMA CITY, OKLAHOMA

PREPARED BY:

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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1.0 INTRODUCTION

Seismic activity is a common occurrence within the State of Oklahoma and earthquake magnitude and frequency is routinely monitored by both the United States Geological Survey (USGS) and the Oklahoma Geological Survey (OGS) through a series of monitoring stations designed to pinpoint the earthquake location and depth. Earthquakes in Oklahoma are typically low in magnitude and relatively shallow in depth with many of the earthquakes too small to be felt.

The majority of earthquakes which occur in Oklahoma are concentrated within a 25-37 mile wide area in western McClain and Garvin Counties. Southeastern Lincoln County, the county in which the Mid-Way Environmental Services, Inc. (Mid-Way) Class I Non-hazardous Waste Injection Well is located, is also known to be seismically active; especially along a segment of the Wilzetta fault which extends in a southwest/northeast direction and crosses southeastern Lincoln County. The Wilzetta fault is one of a series of small faults formed in the Pennsylvanian Epoch (approx. 300 million year ago) during the intra-plate deformation known as the Ancestral Rocky Mountains mountain-building episode. The Mid-Way Environmental Services, Inc. injection well is located approximately 6-7 miles west of the closest point of the Wilzetta fault line as it passes to the east of Davenport and Stroud, Oklahoma

Another fault, the Meers fault, is located in south-central Oklahoma, about 100 km (~62 miles) southwest of Oklahoma City, is the only fault identified in the state with evidence of surface-rupturing earthquakes in the last 3000 years (prior to historical settlement of the region). Paleoseismology studies have identified a temporal clustering of a least three earthquakes on this fault, two of which are dated (1200-2900 years before present) and the third is believed to be older in age.

This Seismicity Contingency Plan has been prepared to identify the methods and procedures for monitoring seismic activity in the area of the Mid-Way Non-hazardous Waste Injection Well facility and is being submitted to the Oklahoma Department of Environmental Quality (DEQ) in accordance with Part A, Item 10 of the Mid-Way Operations Permit.

1.1 Purpose

The purpose of this plan is to identify the methods to be utilized to identify and report to DEQ all earthquakes whose epicenters are within a three (3) mile radius of the injection well. Earthquakes whose magnitudes are both felt and unfelt by persons living and/or working in the area near the injection well will be recorded and reported. In addition, this Seismicity

Contingency Plan identifies the procedures to be taken by Mid-Way in the event of a major earthquake within the general vicinity of the injection well and facility.

2.0 Earthquake Monitoring

Monitoring of earthquakes will be conducted primarily through the USGS Earthquake Notification Service. The Earthquake Notification Service is a customizable system that sends automated notification of earthquake activity to an e-mail address and/or linked cell phone. The service can be customized to provide earthquake information on a local, regional, or world-wide basis. Mid-Way will also monitor Oklahoma Geological Survey news releases, statewide news media and other local media for information on reported earthquakes.

2.1 Methodology

Key facility management personnel will be assigned the responsibility to monitor the occurrence of earthquakes in the general area and to coordinate the appropriate procedures to be followed in the event of a strong earthquake. To effectively monitor the earthquake activity, an account will be established with the USGS Earthquake Notification System to provide information on all earthquakes whose epicenters are within a three (3) mile radius (4.8 Km) of the injection well. A facility e-mail account will be utilized for receipt of notifications and a database established for recording the notifications. The e-mail account will be linked to facility management cell phones to allow management to receive real time notification of any earthquake events which occur.

2.2 Magnitude Monitoring Limitation

Information for earthquakes in the U.S. is generally available within 5 minutes of the occurrence. Within the United States, USGS typically locates earthquakes down to about magnitude 2.0 on the Richter scale, and about magnitude 4.0 for the rest of the world.

However, for purposes of notification and recording, Mid-Way will request through the Earthquake Notification Service account that all earthquakes within a three mile radius of the injection well having a magnitude of 1.0 or greater be reported to Mid-Way.

Data gathered by USGS indicates that the vast majority of earthquakes recorded in the United States have a magnitude between 2.0 and 5.0 on the Richter scale. Tables 1 and 2 present historic data on earthquakes recorded in the United States during the period of 1990 through 2012. The data indicates that earthquakes having a magnitude below 1.0 are rare, with none having been reported during the 1990s, and only three (3) having been reported during the

period 2000 through 2012. Therefore, limiting the recording level to magnitude 1.0 and above appears reasonable and appropriate.

Table 1 Number of Earthquakes in the United States for 1990 – 1999*

Magnitude	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
8.0 to 9.9	0	0	0	0	0	0	0	0	0	0
7.0 to 7.9	0	2	2	0	1	0	2	0	0	2
6.0 to 6.9	2	4	15	9	4	6	4	6	3	6
5.0 to 5.9	64	49	72	62	64	45	100	63	62	50
4.0 to 4.9	284	242	404	270	333	350	612	362	411	352
3.0 to 3.9	626	713	1717	1119	1543	1058	1060	1072	1053	1398
2.0 to 2.9	414	559	998	1009	1196	822	654	759	742	814
1.0 to 1.9	1	3	5	7	2	0	0	2	0	0
0.1 to 0.9	0	0	0	0	0	0	0	0	0	0
No Magnitude	877	599	368	457	444	444	375	575	508	381
Total	2268	2171	3581	2933	3587	2725	2807	2839	2779	3003

*Located by the US Geological Survey National Earthquake Information Center

Table 2 Number of Earthquakes in the United States for 2000 - 2012*

Magnitude	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
8.0 to 9.9	0	0	0	0	0	0	0	0	0	0	0	0	0
7.0 to 7.9	0	1	1	2	0	1	0	1	0	0	1	1	0
6.0 to 6.9	6	5	4	7	2	4	7	9	9	4	8	3	5
5.0 to 5.9	63	41	63	54	25	47	51	72	85	58	89	51	27
4.0 to 4.9	281	290	536	541	284	345	346	366	432	288	631	347	271
3.0 to 3.9	917	842	1535	1303	1362	1475	1213	1137	1486	1492	3584	1838	1236
2.0 to 2.9	660	646	1228	704	1336	1738	1145	1173	1573	2379	4132	2941	2251
1.0 to 1.9	0	2	2	2	1	2	7	11	13	26	39	47	43
0.1 to 0.9	0	0	0	0	0	0	1	0	0	1	0	1	0
No Magnitude	415	434	507	333	540	73	13	22	20	14	12	8	3
Total	2342	2261	3876	2946	3550	3685	2783	2791	3618	4262	8496	5237	3836

*Located by the US Geological Survey National Earthquake Information Center - (M2.5+; doesn't include US regional network contributions)

Source (Table 1 and Table 2): USGS web site (<http://earthquake.usgs.gov/earthquakes/eqarchives/year/eqstats.php>) accessed 8/27/2014.

2.3 Recording

Data received from the USGS Earthquake Notification Service on all earthquakes occurring within a three mile radius of the injection well will be saved into a database designed to provide ease of reporting to DEQ. It is anticipated that the database will be in a spreadsheet format. Data to be recorded will include the date and time of the earthquake; the longitude and latitude coordinates of the earthquake epicenter; depth of the earthquake focus; and reported magnitude. USGS notifications of modification to previously reported earthquake data will also be recorded in the database.

2.4 Reporting

The Mid-Way injection well is located in an area of Oklahoma that is not known to be seismically active and the amount of data to be received from the USGS Earthquake Notification Services is anticipated to be minimal. As such, reporting of earthquake activity within the three mile radius of the injection well will occur on a quarterly basis. The quarterly reporting frequency is consistent with other permit required reporting activities for the injection well. Reporting will include all data gathered and recorded in the database described above.

3.0 Additional Seismic Monitoring

Based on the magnitude and frequency of earthquakes observed during monitoring, and as determined by the DEQ, Mid-Way will conduct additional monitoring through the USGS Earthquake Notification Service. Mid-Way acknowledges that in the event of a strong earthquake (≥ 6.0 magnitude) within the general vicinity of the injection well, additional consideration must be given to ensuring well integrity. Potential impacts from a seismic event of this magnitude may include separation of casing or tubing, casing collapse, and/or open-hole collapse. As a safety precaution, Mid-Way has included in the design of the well, continuous monitoring and recording with automatic shut-down controls to prevent injection of fluids in the event that well integrity is compromised. A Programmable Logic Controller (PLC) system has been designed and implemented at the injection well to monitor and record the entire injection system and initiate alarms and emergency shut-down of injection in the event of abnormal increase or decrease in monitored pressures. Monitoring of well conditions and integrity is designed to detect the potential impacts expected from a strong seismic event as described above. Automated detection of such events enables emergency shut-down interlocks to safely shut-down injection so that the situation can be assessed.

It is currently anticipated that a separate Earthquake Notification Service account will be established by Mid-Way to monitor larger earthquakes within the general vicinity (15 mile radius) of the injection well. This separate account will be customized to monitor earthquakes greater than or equal to a 6.0 magnitude. Recording and reporting of earthquakes of this magnitude (≥ 6.0) within the 15 mile radius of the injection well will be similar to the permit required monitoring described in **Section 2.0** above.

During normal business hours and upon notification of a seismic event ≥ 6.0 magnitude within the general vicinity, facility personnel will be required to methodically inspect all piping, tanks, and equipment to ensure that no damage has been sustained; no leaks are evident; and all equipment is fully operational. Mid-Way personnel will conduct a visual inspection of the injection pump house, flow equalization tanks, and filter building as outlined above. In addition, Mid-Way personnel will inspect the Waste Storage tanks, pumps and all other piping for leaks.

In the event of notification of a strong earthquake when the facility is closed, facility personnel will be required to methodically inspect all piping, tanks, and equipment *prior to* initiation of injection activities. Facility personnel will be trained on procedures to be followed in the event of notification of a major earthquake in the general area.

Based upon notification of a strong earthquake (≥ 6.0 magnitude) in the vicinity of the injection well *and* a PLC system shut-down condition MES will:

1. Verbally (or through e-mail) notify DEQ of the shut-down condition;
2. Inspect all surface piping and facilities for leaks, verify well head and annulus pressures, and evaluate all PLC components for potential false signals;
3. Notify DEQ whether or not a loss of mechanical integrity is discovered;
4. If no loss of integrity is discovered, DEQ will be notified of system start-up. If loss of mechanical integrity is discovered, a corrective action plan will be developed for DEQ approval;
5. Implement any necessary corrective action;
6. Restore and demonstrate mechanical integrity to the satisfaction of ODEQ prior to resuming the injection of waste fluids.

4.0 Modification to Operating Parameters

Mid-Way is committed to operating the injection well and facility in an environmentally safe and sound manner and recognizes that modification to operating parameters may be necessary if periods of increased seismicity are observed within the monitored three mile radius of the injection well.

In the event that the frequency of earthquakes in the area appears to be increasing within the immediate area of the injection well, Mid-Way will contact the DEQ within 48 hours of the observed increase to discuss the matter. For purposes of this Seismicity Contingency Plan and for DEQ notification purposes, an “increase in frequency” is defined as three (3) or more earthquakes occurring within a 3 month period and whose epicenter is within a one (1) mile radius of the injection well. Only those earthquakes whose magnitude is reported to be ≥ 3.0 on the Richter scale will be considered.

Modeling previously conducted on the Mid-Way injection well and provided to DEQ showed that after 10 years of operation with continuous injection at a rate of 11 barrels per minute (bbl/min), the front of injected fluids is estimated to be only 2,100 ft away from the Mid-Way injection well. After 50 years of continuous injection, the front is estimated to be 5,400 ft (approximately one mile) away from the well. The modeled rate is actually greater than the maximum permitted allowable injection rate. As such, utilizing a one mile radius of evaluation to define an “increase in frequency” appears reasonable and appropriate.

Depending on the level of increased seismicity observed, Mid-Way will unilaterally reduce the daily maximum permitted injection volume by 20% until discussions are held with DEQ and agreement to resume injection at the maximum permitted volume is obtained or the increased seismic activity is no longer evident.

During the injection volume reduction period, if no seismic activity above a 3.0 magnitude is recorded within a one mile radius of the injection well over a three consecutive month period, Mid-Way will resume injection up to the maximum permitted volume.

5.0 Additional Geotechnical Information

Mid-Way recognizes that determination of the cause or causes of an increase in observed seismic activity within a one mile radius of the injection well may require gathering additional

operational and geotechnical information. Mid-Way is committed to assisting DEQ in gathering and evaluating all additional information of the area including but not limited to records of recent petroleum exploration activities in the area, on-going oil and gas production and operating activities, identification of private and commercial salt water injection activities, and other geotechnical information deemed necessary.

6.0 Increased Frequency of Well Testing

Mid-Way further understands that an increase in seismic activity may result in a need for an increased frequency in pressure fall off testing and pressure buildup monitoring within the injection zone at the facility. If conditions warrant, Mid-Way will increase the frequency of pressure fall off testing in accordance with permit requirements from an annual to a semi-annual basis. If semi-annual fall off testing is implemented, Mid-Way will coordinate and obtain agreement from DEQ prior to reverting to annual fall off testing.